



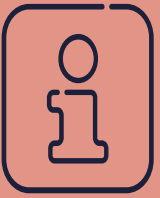
American Oncology Institute, Jammu.

SUMMER INTERNSHIP REPORT

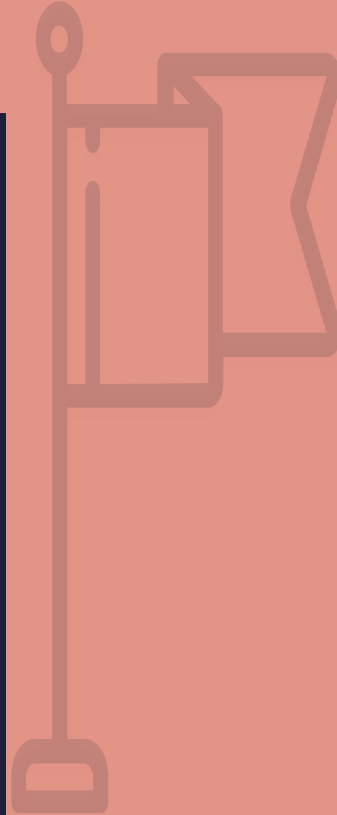
Devanshi Gupta

MBA-HM25

1092



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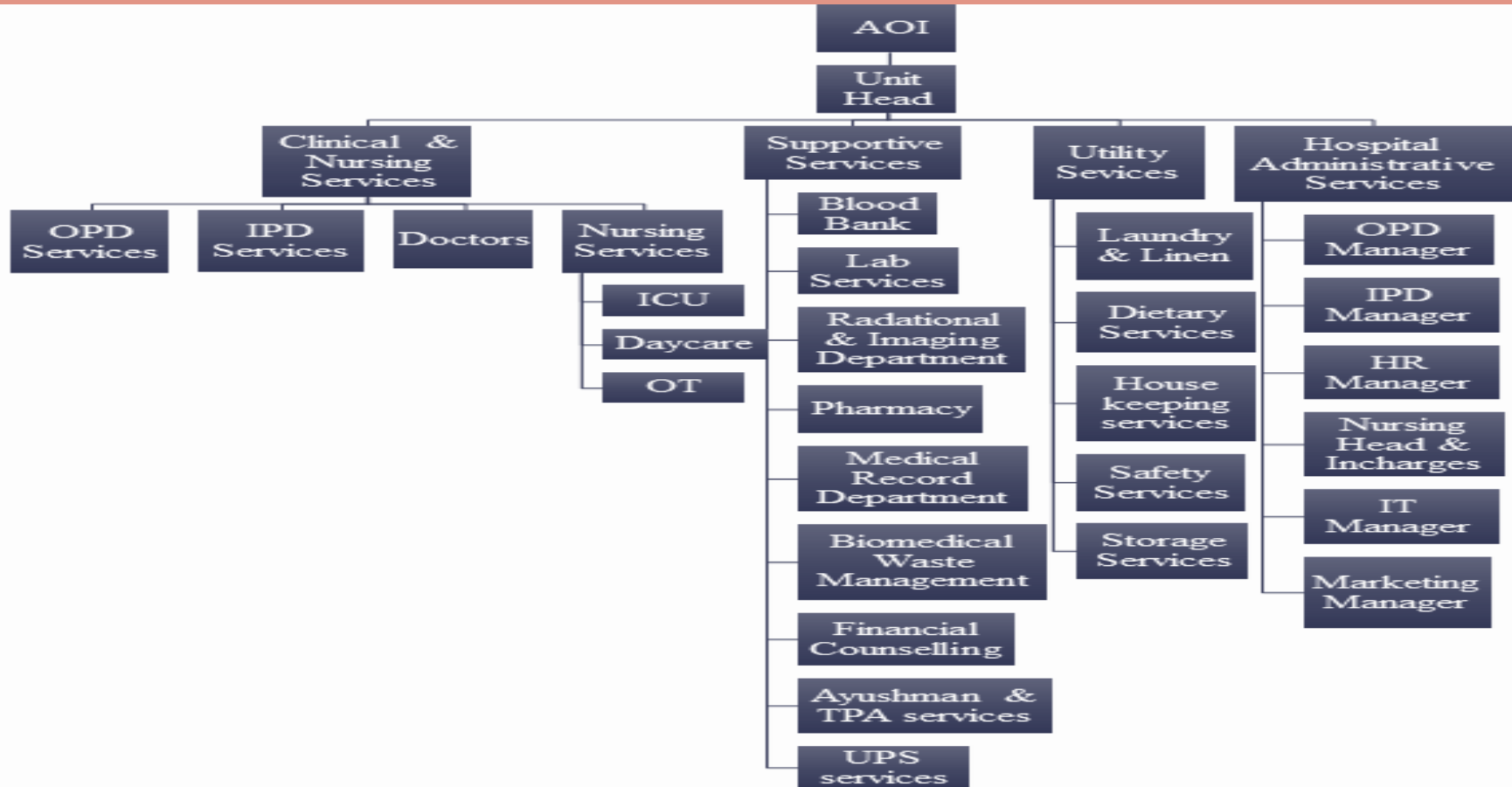
INTRODUCTION

- Organizational hierarchy
- Reception
- Consultation
- PET-CT
- Billing
- Ayushman desk
- Daycare
- Pharmacy
- Linen and laundry

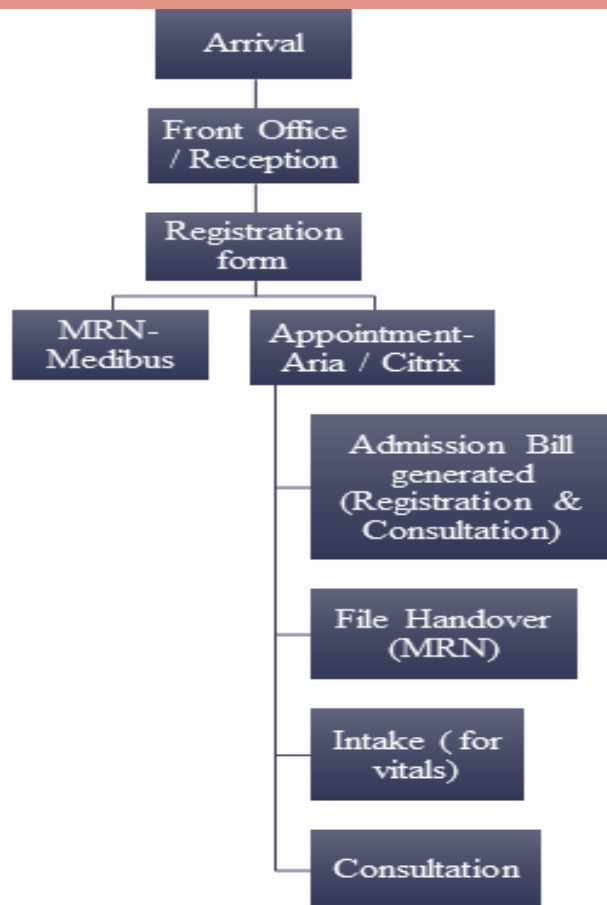
Project- **Study on Turnaround Time of Chemotherapy from the arrival of the patient till the initiation of the first drug**

- Research question
- Rationale
- Objective
- Methodology
- Analysis and interpretation
- Findings- cause and effect.
- Conclusion
- Recommendations

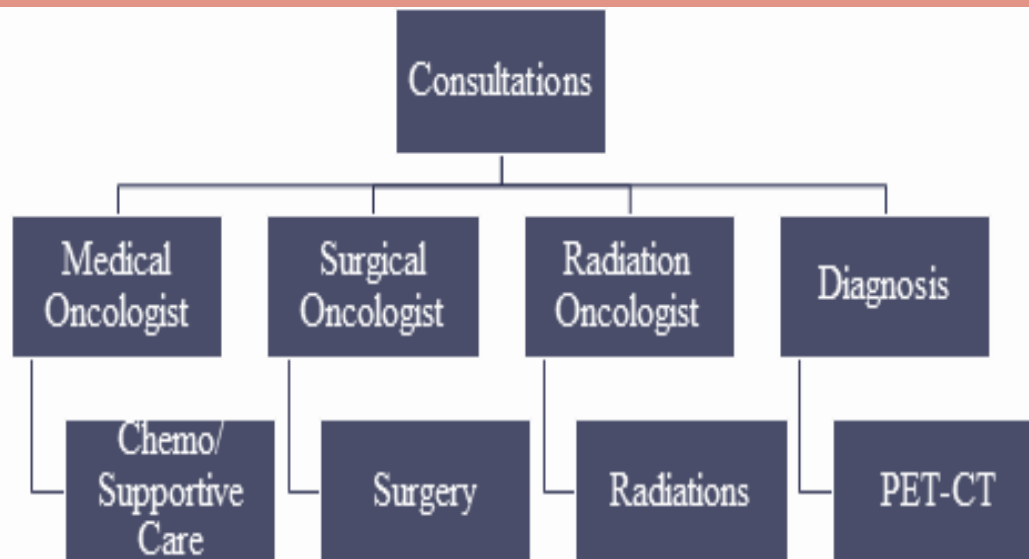
INTRODUCTION- Organisation Hierarchy



Reception



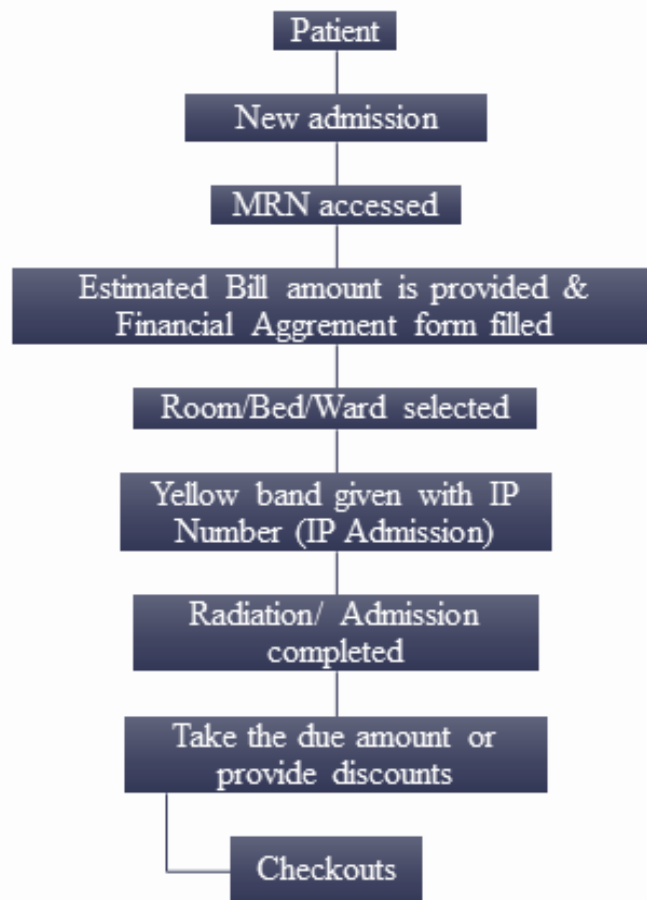
Consultation



PET-CT



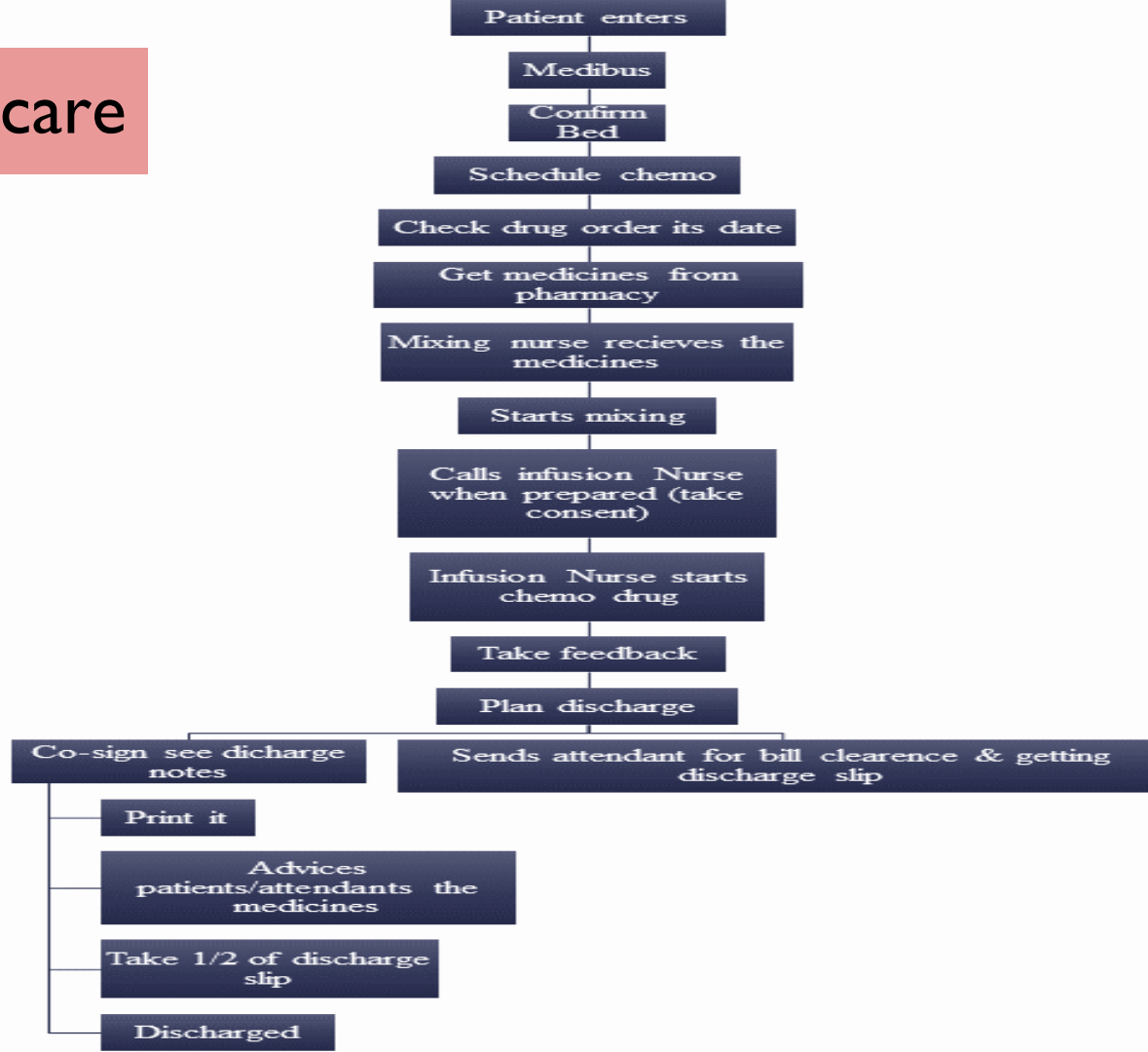
Billing

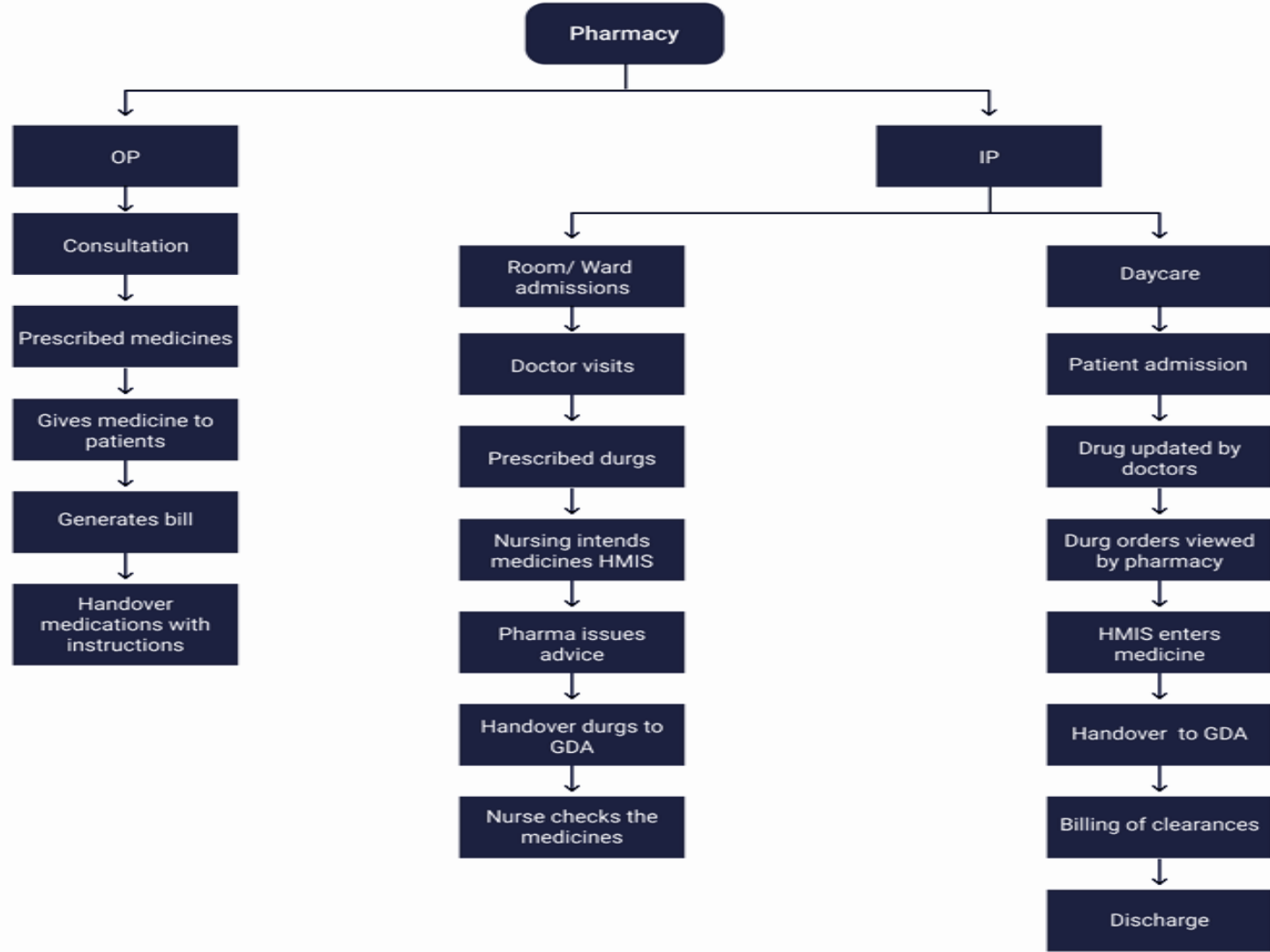


Ayushman Bharat



Daycare







INSTITUTE ASCOMS HOSPITAL
PRECISION CANCER CARE

694

LINEN BOOK

DATE: _____
DEPT.: _____

S.No.	LINEN	QTY	GIVEN BY	REC QTY	REC BY	PENDING	SIGN
1	BEDSHEET						
2	PILLOW COVER						
3	PATIENT GOWN						
4	PATIENT DRESS LOWER						
5	BLANKET						
6	BLANKET COVER						
7	GREEN TOWEL						
8	HOLE SHEET						
9	BATH TOWEL						
10	WRAPPER						
11	SURGEON GOWN						
12	BIG SHEET (GREEN)						
13	MEDIUM SHEET (GREEN)						
14	SMALL SHEET (GREEN)						
15	HAND NAPKIN						
16	LEGGINS						
17	HOLE SHEET (BIG)						
18	DOCTOR-PANT						
19	DOCTOR-SHIRT						
20	NURSE-PANT						
21	NURSE-SHIRT						
22	TECHNICIAN PANT						
23	TECHNICIAN SHIRT						
24	TROLLEY COVER						
25	HK SHIRT/PANT						
26	APRONS						
27	C-ARM COVER						

Project

Study on Turnaround Time of Chemotherapy from the arrival of the patient till the initiation of the first drug

These are the total 8 steps that are performed after the arrival of the patient in the unit.

Time	T1	T2	T3	T4	T5	T6	T7	T8
Standard time	0	2	10	2	2	8	2	4
Process	Receiving the patient to daycare	Approval in Aria from the pharmacy	Dispense in Medibus	Physical dispense of medicine	Mixing nurse receiving the medicine	Drug mixing time	The infusion nurse receive mixed drug from Admixturer room	The infusion nurse initiates the chemo

RESEARCH QUESTION

What is the turnaround time of chemotherapy initiation from the arrival of the patient till the administration of the first chemo drug and the delays associated with it in the Daycare unit for the months of May and June?

RATIONALE:

- Hospital's management system is questioned in cases of delayed chemo initiation.
- Affect patient's adherence to specific hospital
- Loss for the hospital
- Attendants' satisfaction for positive word of mouth.

RESEARCH OBJECTIVE:

- To check if the turnaround time is falling under 30 minutes of standard time.
- To access the possible reasons if the chemo initiation process is not falling under the standard timing



METHODOLOGY

Both primary and secondary data

Primary data-

- simple random probability sampling and to note the delays via daily observations in the unit.
- done in June using MS Excel.

Secondary data-

- May month was collected from the daycare unit staff which was also collected using MS Excel.

Data analysis: both MS Excel & Minitab was used.

ANALYSIS AND INTERPRETATION

For the first 2 steps (T2-T1)/ Approval in aria from the pharmacy (2 min)

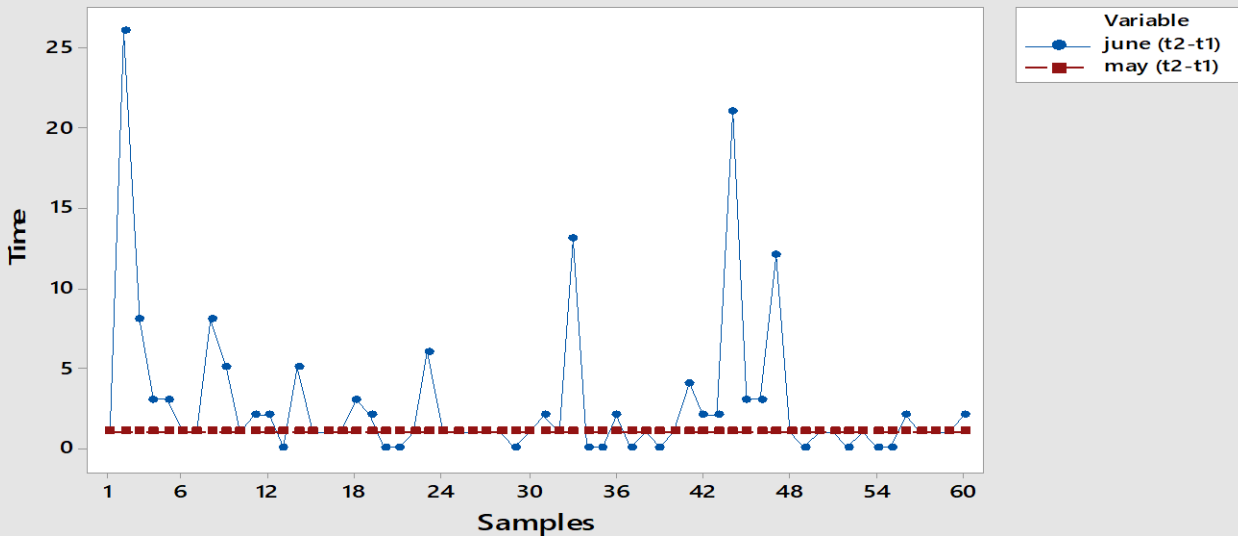
Descriptive Statistics: June (t2-t1), May (t2-t1)

Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
June (t2-t1)	60	0	2.750	0.609	4.714	0.000	1.000	1.000	2.750	26.000
May (t2-t1)	60	0	1.0000	0.000000	0.000000	1.0000	1.0000	1.0000	1.0000	1.0000

Variable	Skewness
June (t2-t1)	3.43
May (t2-t1)	0.29

Time Series Plot of june (t2-t1), may (t2-t1)



For the first 2 steps (T2-T1)/ Approval in aria from the pharmacy

One-way ANOVA: June (t2-t1), may (t2-t1)

Method

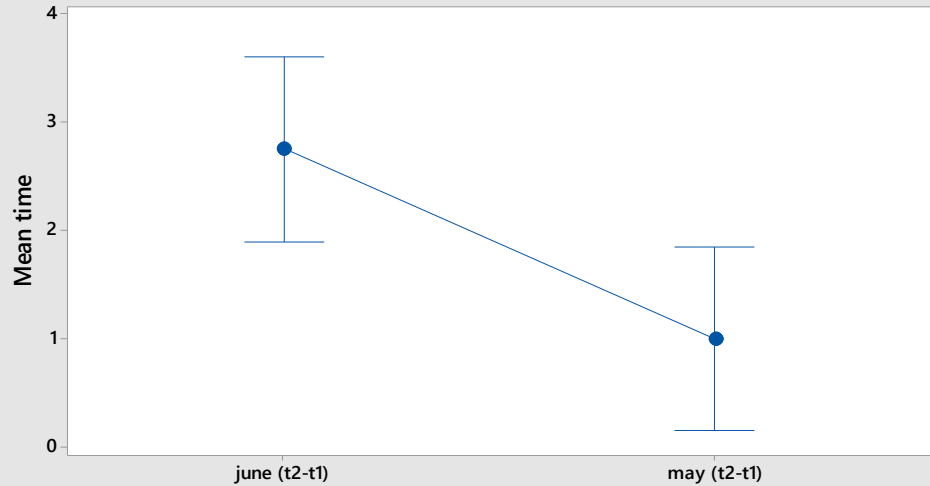
Null hypothesis	All means are equal
Alternative hypothesis	Not all means are equal
Significance level	$\alpha = 0.05$

Means

Factor	N	Mean	StDev	95% CI
June (t2-t1)	60	2.750	4.714	(1.898, 3.602)
May (t2-t1)	60	1.00000	0.00000	(0.14778, 1.85222)

Pooled StDev = 3.33351

Interval Plot of june (t2-t1), may (t2-t1)
95% CI for the Mean



The pooled standard deviation is used to calculate the intervals.

Interpretation:

- The third quartile differs from that of the median showing that the upper halves median is higher than that of both the lower halves. It differs from the first quartile showing the interquartile range as **1.75** (spread in June data).
- The data of June month is positively skewed, (mean>median).

For the next 2 steps (T3-T2)/ Dispense in Medibus (10 min)

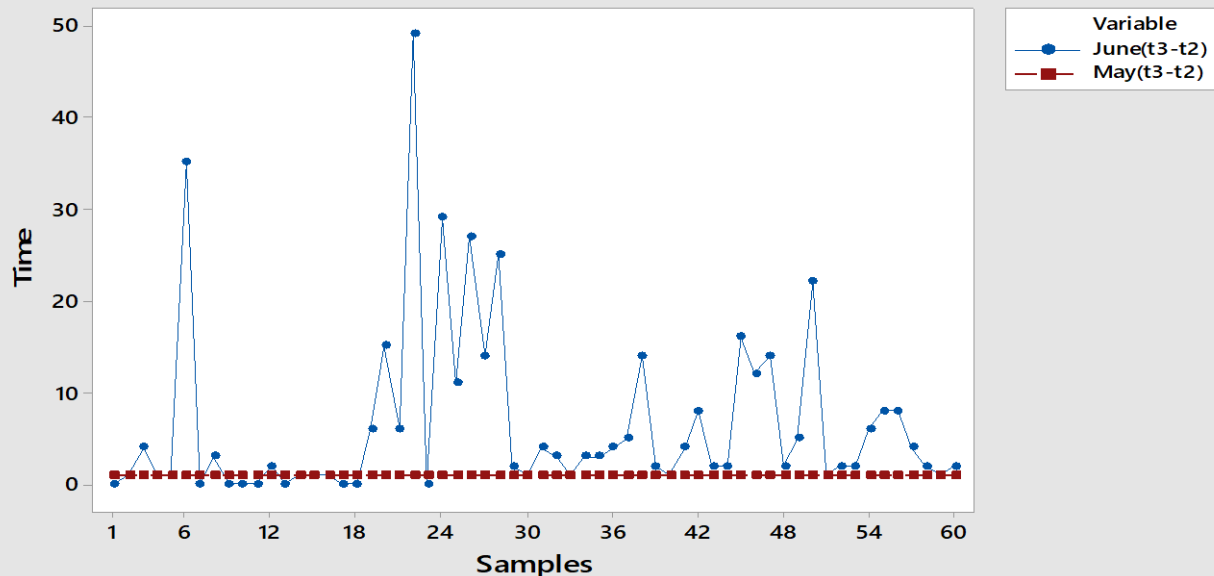
Descriptive Statistics: June(t3-t2), May(t3-t2)

Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
June(t3-t2)	60	0	6.63	1.25	9.67	0.00	1.00	2.50	8.00	49.00
May(t3-t2)	60	0	1.0000	0.000000	0.000000	1.0000	1.0000	1.0000	1.0000	1.0000

Variable	Skewness
June(t3-t2)	2.43
May(t3-t2)	-0.38

Time Series Plot of June(t3-t2), May(t3-t2)



For the next 2 steps (T3-T2)/ Dispense in Medibus

One-way ANOVA: June(t3-t2), May(t3-t2)

Method

Null hypothesis	All means are equal
Alternative hypothesis	Not all means are equal
Significance level	$\alpha = 0.05$

Equal variances were assumed for the analysis.

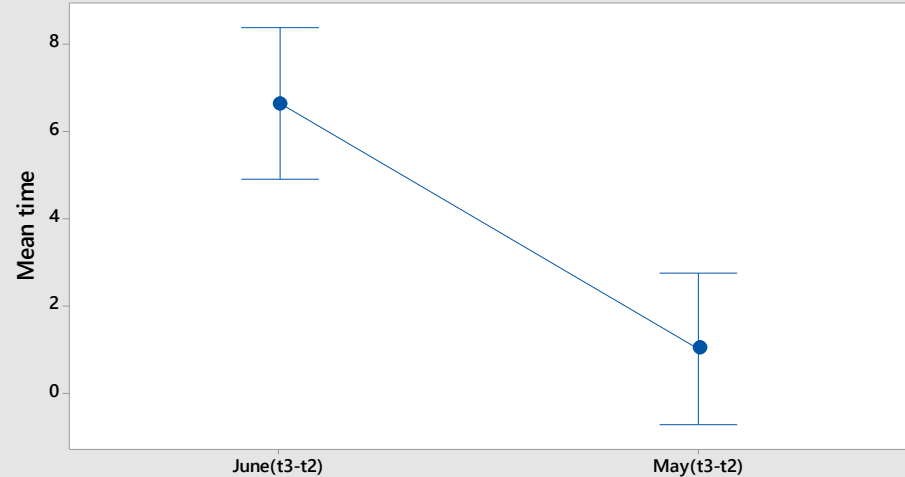
Means

Factor	N	Mean	StDev	95% CI
June(t3-t2)	60	6.63	9.67	(4.89, 8.38)
May(t3-t2)	60	1.00000	0.00000	(-0.74790, 2.74790)

Pooled StDev = 6.83705

Interval Plot of June(t3-t2), May(t3-t2)

95% CI for the Mean



The pooled standard deviation is used to calculate the intervals.

Interpretation:

- The third quartile differs from that of the median showing that the upper halves median is higher than that of both the lower halves. It differs from the first quartile showing the interquartile range as **7** (spread in data of June month).
- The data of June month is positively skewed, (mean>median).

For the next 2 steps (T4-T3)/ Physical dispense of medicine (2 min)

Descriptive Statistics: June (t4-t3), May (t4-t3)

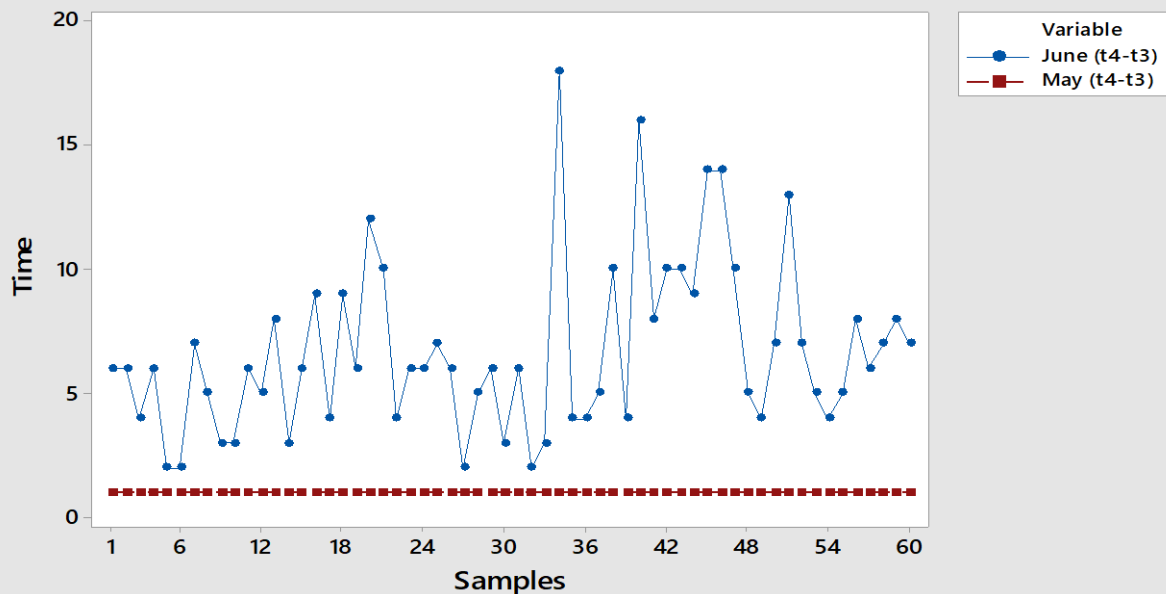
Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
June (t4-t3)	60	0	6.667	0.447	3.462	2.000	4.000	6.000	8.000	18.000
May (t4-t3)	60	0	1.0000	0.000000	0.000000	1.0000	1.0000	1.0000	1.0000	1.0000

Variable	Skewness
June (t4-t3)	1.21
May (t4-t3)	0.21



Time Series Plot of June (t4-t3), May (t4-t3)



For the next 2 steps (T4-T3)/ Physical dispense of medicine

One-way ANOVA: June (t4-t3), May (t4-t3)

Method

Null hypothesis	All means are equal
Alternative hypothesis	Not all means are equal
Significance level	$\alpha = 0.05$

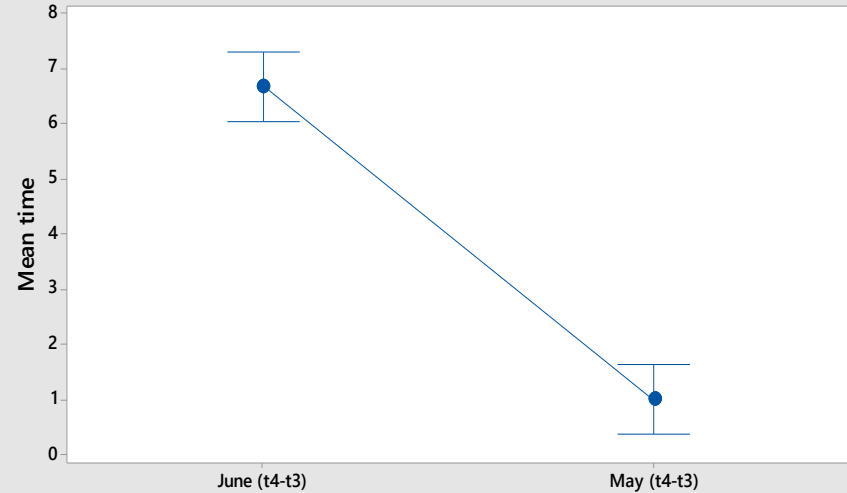
Equal variances were assumed for the analysis.

Means

Factor	N	Mean	StDev	95% CI
June (t4-t3)	60	6.667	3.462	(6.041, 7.293)
May (t4-t3)	60	1.00000	0.00000	(0.37408, 1.62592)

Pooled StDev = 2.44834

Interval Plot of June (t4-t3), May (t4-t3)
95% CI for the Mean



The pooled standard deviation is used to calculate the intervals.

Interpretation:

- The third quartile differs from that of the median showing that the upper halves median is higher than that of both the lower halves. It differs from the first quartile showing the interquartile range as **4** (spread of June month data).
- The data of June month is positively skewed, (mean > median).

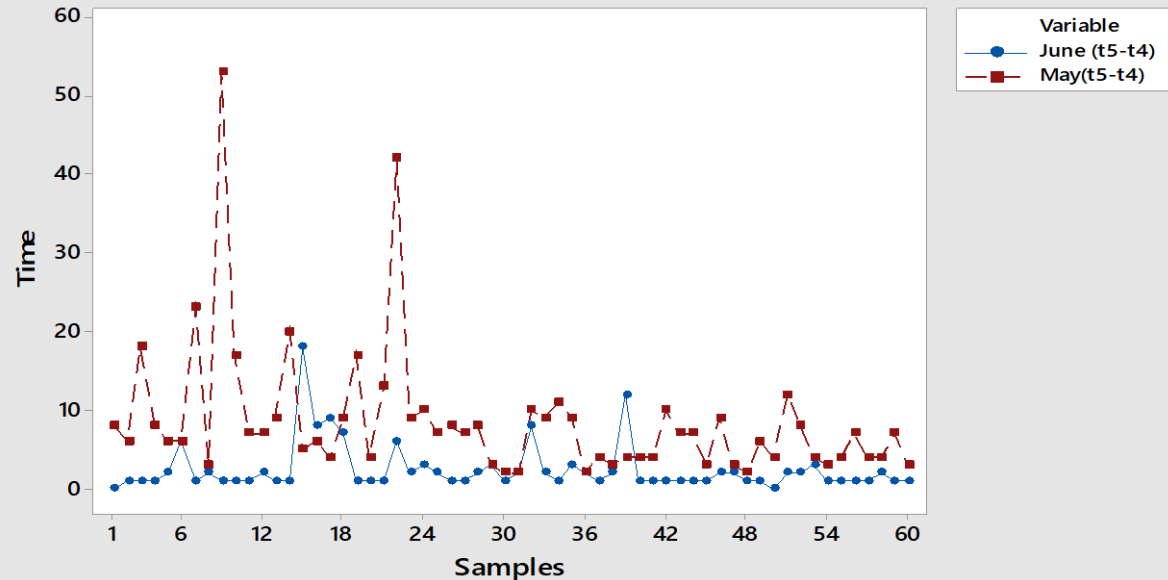
For the next 2 steps (T5-T4)/ Mixing nurse receiving the medicine (2 min)

Descriptive Statistics: June (t5-t4), May(t5-t4)

Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum	Skewness
June (t5-t4)	60	0	2.450	0.399	3.094	0.000	1.000	1.000	2.000	18.000	3.14
May(t5-t4)	60	0	8.57	1.11	8.63	2.00	4.00	7.00	9.00	53.00	3.50

Time Series Plot of June (t5-t4), May(t5-t4)



For the next 2 steps (T5-T4)/ Mixing nurse receiving the medicine

One-way ANOVA: June (t5-t4), May(t5-t4)

Method

Null hypothesis	All means are equal
Alternative hypothesis	Not all means are equal
Significance level	$\alpha = 0.05$

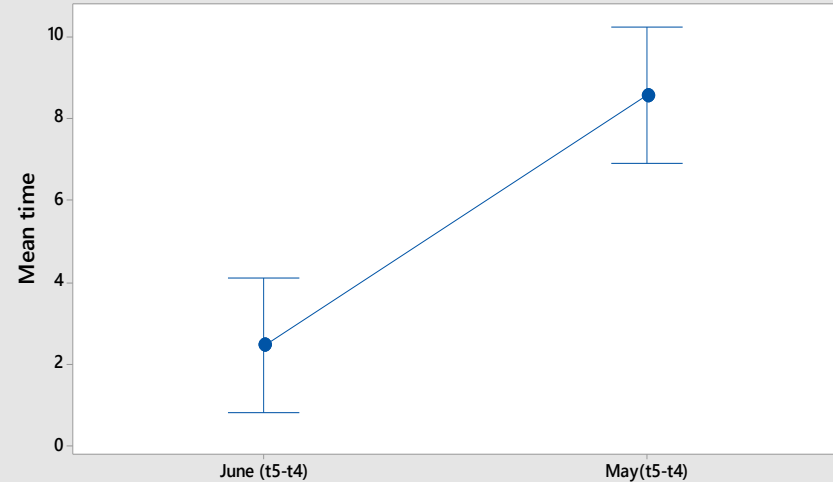
Equal variances were assumed for the analysis.

Means

Factor	N	Mean	StDev	95% CI
June (t5-t4)	60	2.450	3.094	(0.793, 4.107)
May(t5-t4)	60	8.57	8.63	(6.91, 10.22)

Pooled StDev = 6.48178

Interval Plot of June (t5-t4), May(t5-t4)
95% CI for the Mean



The pooled standard deviation is used to calculate the intervals.

Interpretation:

- The third quartile of May month differs from that of the median showing that the upper halves median is higher than that of both the lower halves. It differs from the first quartile showing the interquartile range as **5** (spread in data of the month)(no significant difference in June).
- The data of both months is positively skewed, (mean>median).

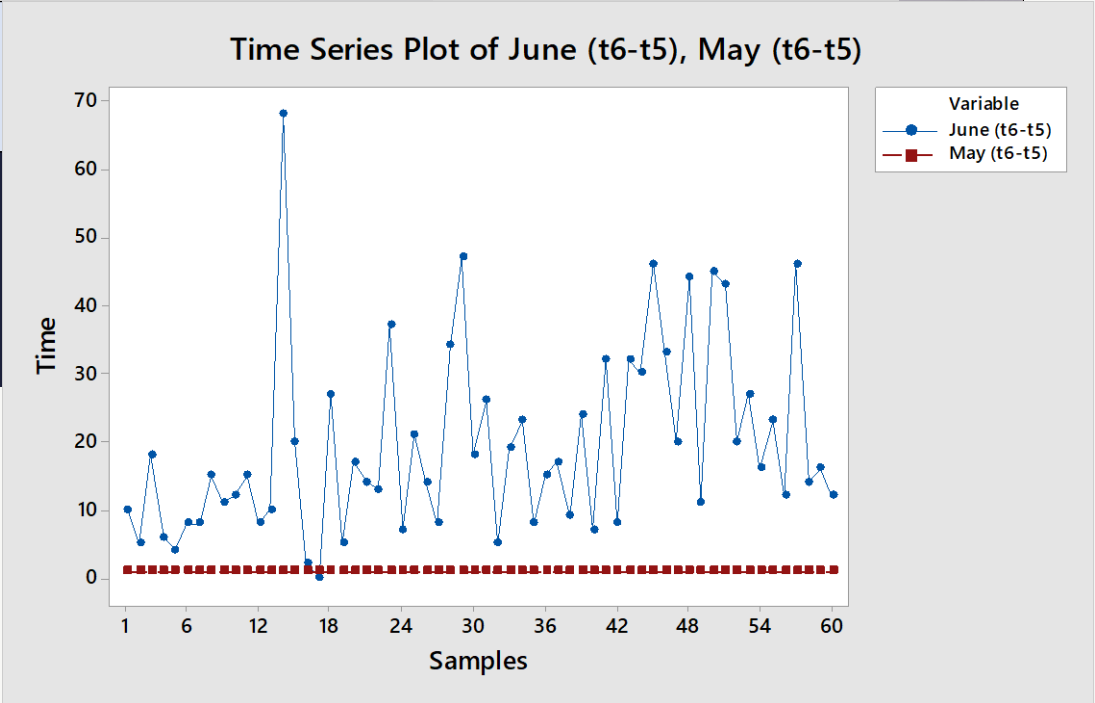
For the next 2 steps (T6-T5)/ Drug mixing time (8 min)

Descriptive Statistics: June (t6-t5), May (t6-t5)

Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
June (t6-t5)	60	0	19.42	1.79	13.85	0.00	8.25	15.50	26.75	68.00
May (t6-t5)	60	0	1.0000	0.000000	0.000000	1.0000	1.0000	1.0000	1.0000	1.0000

Variable	Skewness
June (t6-t5)	1.24
May (t6-t5)	-0.26



For the next 2 steps (T6-T5)/ Drug mixing time

One-way ANOVA: June (t6-t5), May (t6-t5)

Method

Null hypothesis	All means are equal
Alternative hypothesis	Not all means are equal
Significance level	$\alpha = 0.05$

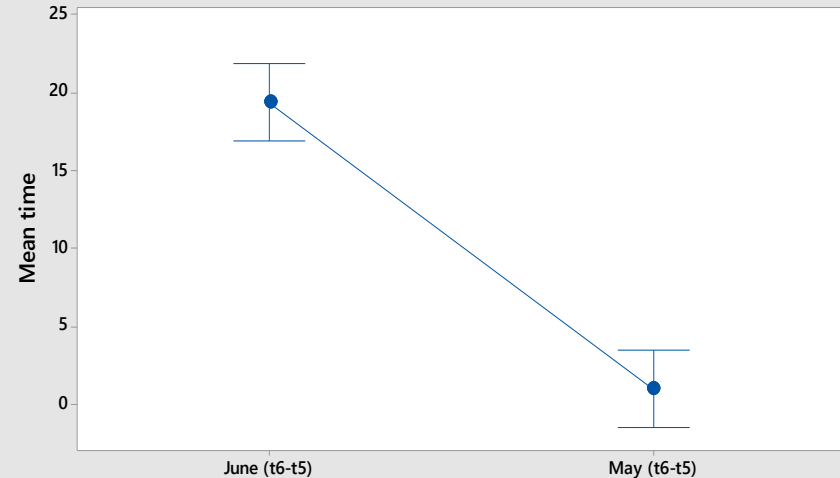
Equal variances were assumed for the analysis.

Means

Factor	N	Mean	StDev	95% CI
June (t6-t5)	60	19.42	13.85	(16.91, 21.92)
May (t6-t5)	60	1.00000	0.00000	(-1.50449, 3.50449)

Pooled StDev = 9.79648

Interval Plot of June (t6-t5), May (t6-t5)
95% CI for the Mean



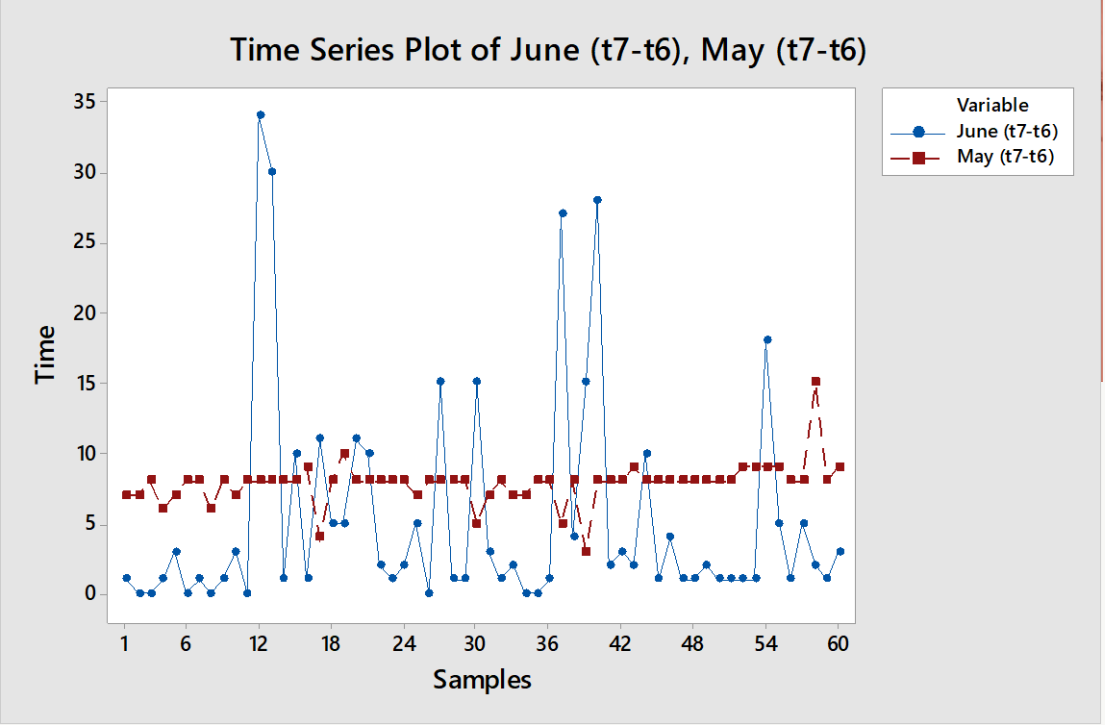
The pooled standard deviation is used to calculate the intervals.

Interpretation:

- The third quartile differs from that of the median showing that the upper halves median is higher than that of both the lower halves. It differs from the first quartile showing the interquartile range as **18.5** (high spread June month).
- The data of June month is positively skewed, (mean>median).

For the next 2 steps (T7-T6)/ Infusion nurse receives mixed drug from the Adm. Room (2)

Descriptive Statistics: June (t7-t6), May (t7-t6)												
Statistics												
Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum	Skewness	
June (t7-t6)	60	0	5.27	1.02	7.91	0.00	1.00	2.00	5.00	34.00	2.24	
May (t7-t6)	60	0	7.817	0.194	1.501	3.000	8.000	8.000	8.000	15.000	0.85	



For the next 2 steps (T7-T6)/ Infusion nurse receives mixed drug from the Adm. room

One-way ANOVA: June (t7-t6), May (t7-t6)

Method

Null hypothesis All means are equal
Alternative hypothesis Not all means are equal
Significance level $\alpha = 0.05$

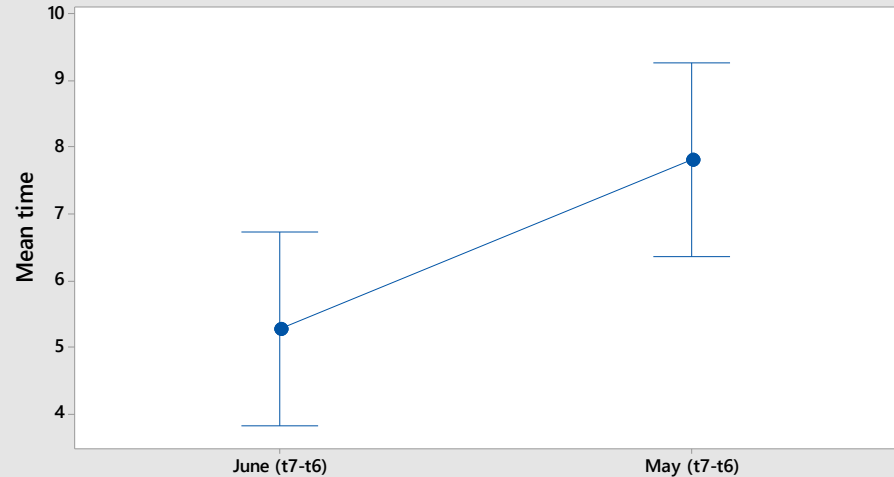
Equal variances were assumed for the analysis.

Means

Factor	N	Mean	StDev	95% CI
June (t7-t6)	60	5.27	7.91	(3.81, 6.72)
May (t7-t6)	60	7.817	1.501	(6.360, 9.273)

Pooled StDev = 5.69621

Interval Plot of June (t7-t6), May (t7-t6)
95% CI for the Mean



The pooled standard deviation is used to calculate the intervals.

Interpretation:

- The third quartile differs from that of the median showing that the upper halves median is higher than that of both the lower halves. It differs from the first quartile showing the interquartile range as **4** (spread in June month).
- The data of both months is positively skewed, (mean>median).

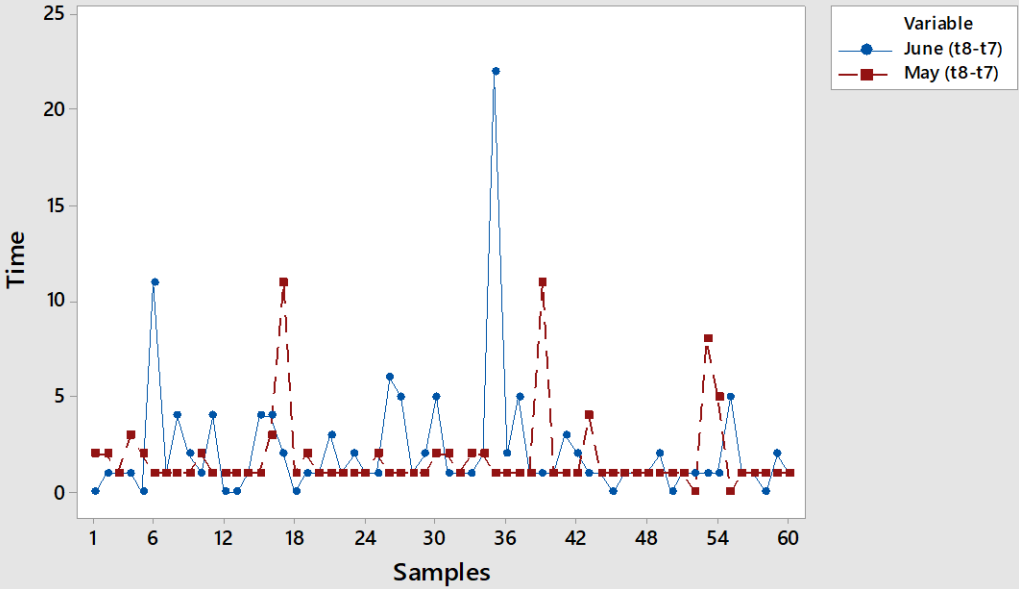
For the next 2 steps (T8-T7)/ Infusion nurse initiates chemotherapy (4 min)

Descriptive Statistics: June (t8-t7), May (t8-t7)

Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum	Skewness
June (t8-t7)	60	0	2.150	0.416	3.220	0.000	1.000	1.000	2.000	22.000	4.50
May (t8-t7)	60	0	1.767	0.270	2.094	0.000	1.000	1.000	2.000	11.000	3.51

Time Series Plot of June (t8-t7), May (t8-t7)



For the next 2 steps (T8-T7)/ Infusion nurse initiates chemotherapy.

One-way ANOVA: June (t8-t7), May (t8-t7)

Method

Null hypothesis	All means are equal
Alternative hypothesis	Not all means are equal
Significance level	$\alpha = 0.05$

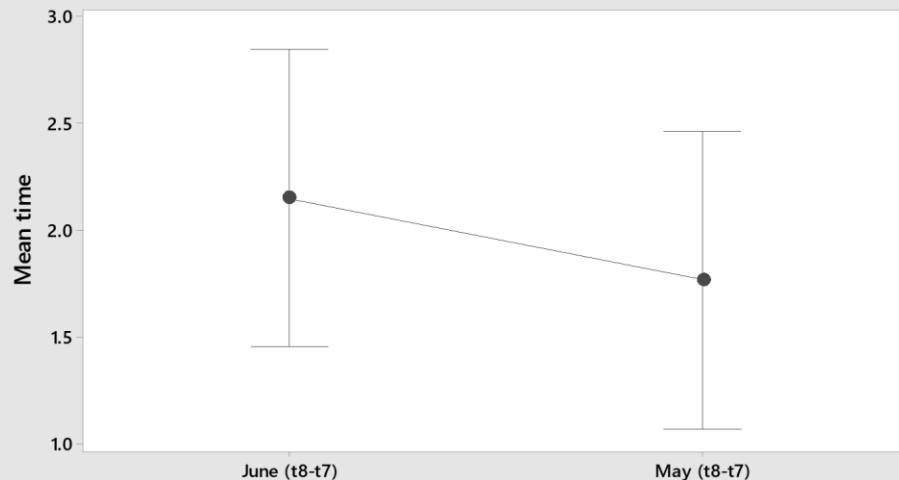
Equal variances were assumed for the analysis.

Means

Factor	N	Mean	StDev	95% CI
June (t8-t7)	60	2.150	3.220	(1.456, 2.844)
May (t8-t7)	60	1.767	2.094	(1.072, 2.461)

Pooled StDev = 2.71590

Interval Plot of June (t8-t7), May (t8-t7)
95% CI for the Mean



The pooled standard deviation is used to calculate the intervals.

Interpretation:

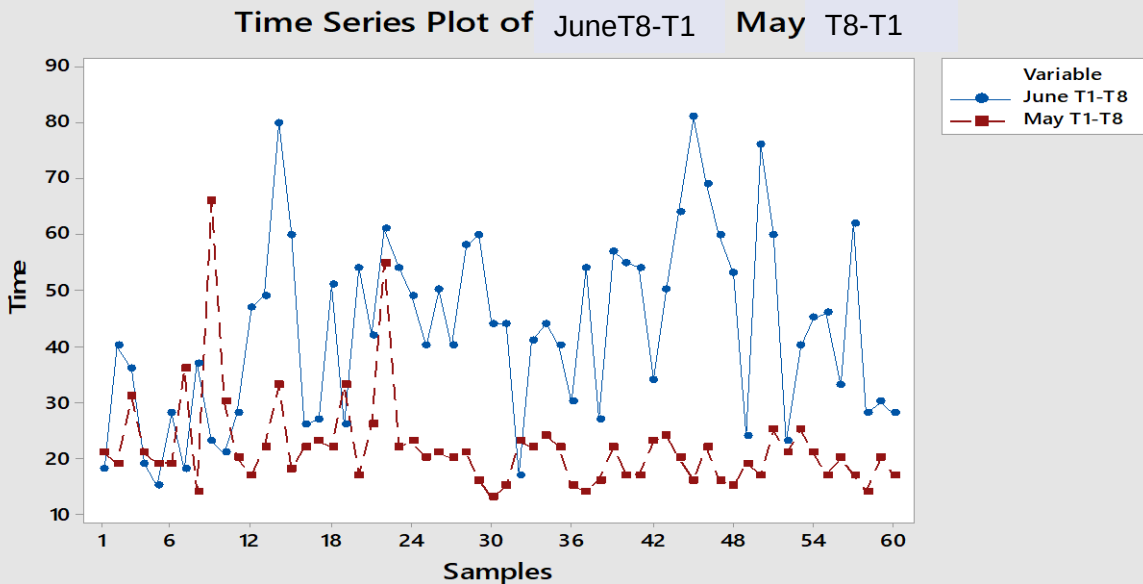
- The third quartile of both the months differs a bit from that of the median showing that the upper halves median nearly equal to both the lower halves. It differs from the first quartile showing the interquartile range as **1** (low amount of spread in both months).
- The data of both months is positively skewed, (mean>median).

OVERALL Process T8-T1

Descriptive Statistics: June T8-T1, May T8-T1

Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum	Skewness
June T1-T8	60	0	42.83	2.12	16.39	15.00	28.00	43.00	54.00	81.00	0.27
May T1-T8	60	0	21.93	1.13	8.73	13.00	17.00	20.50	23.00	66.00	3.25



OVERALL Process T8-T1.

One-way ANOVA: June T8-T1, May T8-T1

Method

Null hypothesis	All means are equal
Alternative hypothesis	Not all means are equal
Significance level	$\alpha = 0.05$

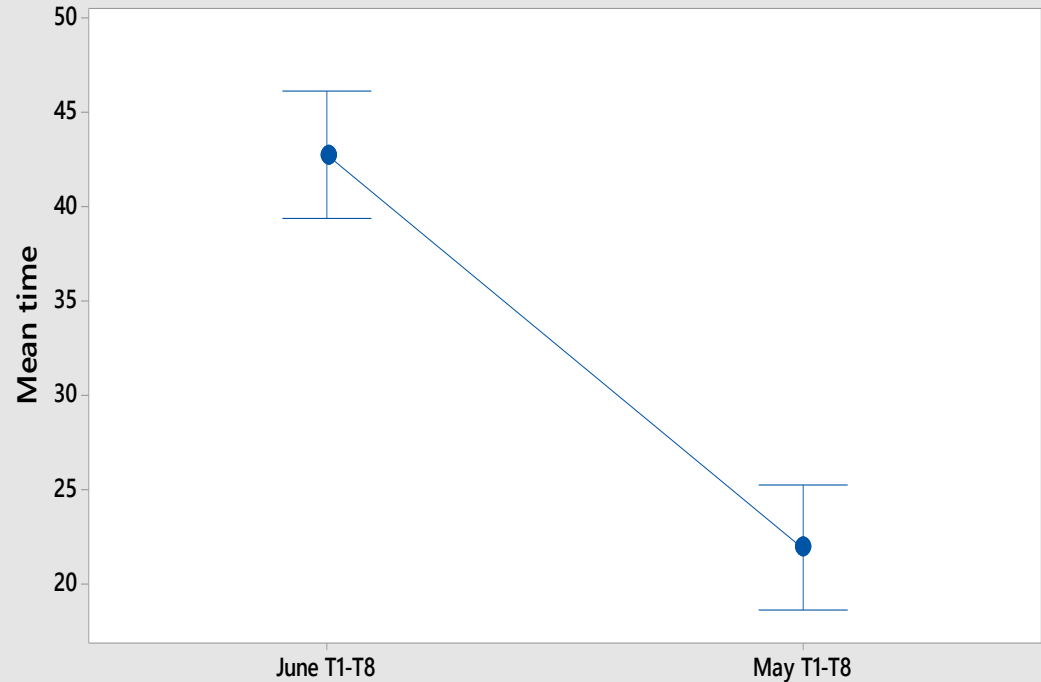
Equal variances were assumed for the analysis.

Means

Factor	N	Mean	StDev	95% CI
June T1-T8	60	42.83	16.39	(39.48, 46.19)
May T1-T8	60	21.93	8.73	(18.58, 25.29)

Pooled StDev = 13.1317

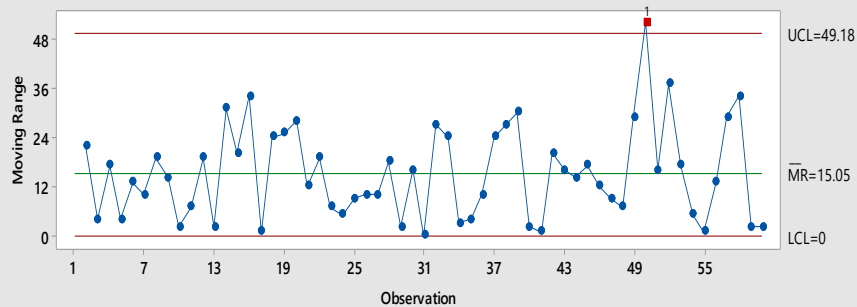
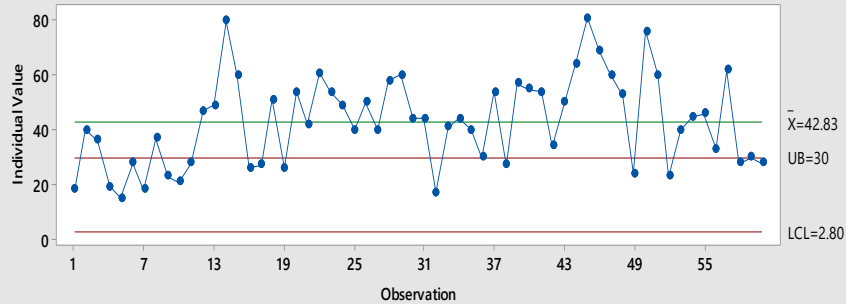
Interval Plot of JuneT8-T1, May T8-T1 95% CI for the Mean



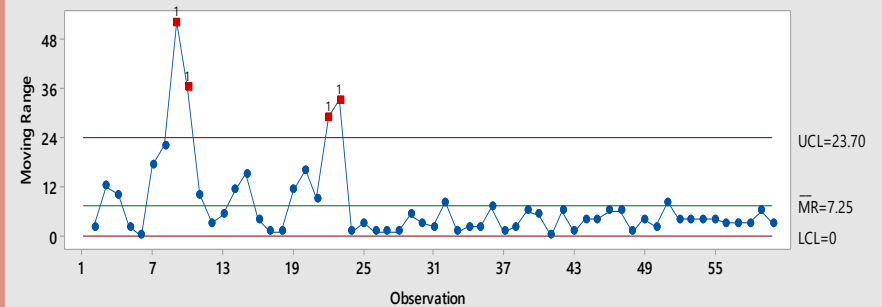
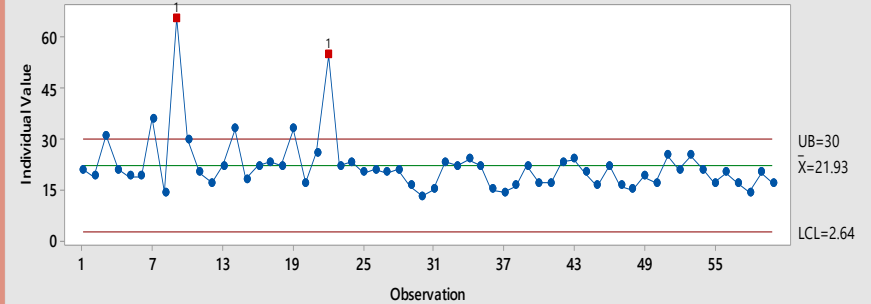
The pooled standard deviation is used to calculate the intervals.

I-MR Charts of June & May (T8-T1)

I-MR Chart of June T1-T8



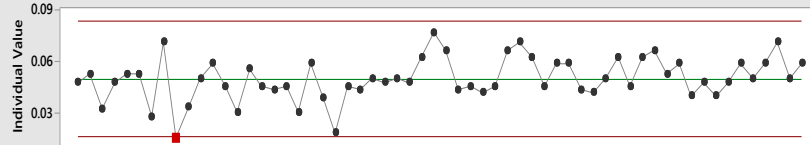
I-MR Chart of May T1-T8



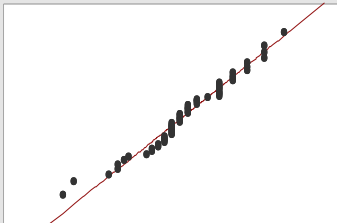
Capability analysis of May

Capability Analysis for May T1-T8 Diagnostic Report

I-MR Chart (transformed)
Confirm that the process is stable.



Normality Plot ($\lambda = -1.00$)
The points should be close to the line.

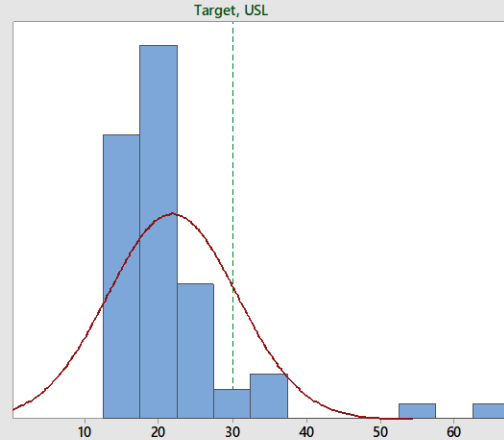


Normality Test
(Anderson-Darling)

	Original	Transformed
Results	Fail	Pass
P-value	< 0.005	0.086

Capability Analysis for May T1-T8 Process Performance Report

Capability Histogram
Are the data below the limit and close to the target?



— Actual (overall) capability is what the customer experiences.
--- Potential (within) capability is what could be achieved if process shifts and drifts were eliminated.

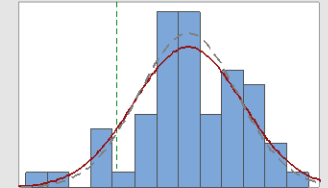
Process Characterization

Total N	60
Subgroup size	1

Capability Statistics

Actual (overall)	*
Pp	0.44
Ppk	1.32
Z.Bench	10.00
% Out of spec (observed)	9.28
PPM (DPMO) (observed)	100000
PPM (DPMO) (expected)	92793
Potential (within)	*
Cp	0.48
Cpk	1.45
Z.Bench	7.33
% Out of spec (expected)	73328
PPM (DPMO) (expected)	

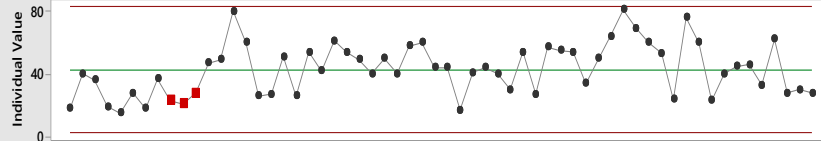
Transformed Data



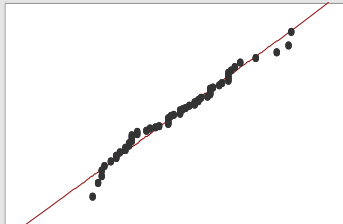
Capability analysis of June

Capability Analysis for June T1-T8
Diagnostic Report

I-MR Chart
Confirm that the process is stable.



Normality Plot
The points should be close to the line.

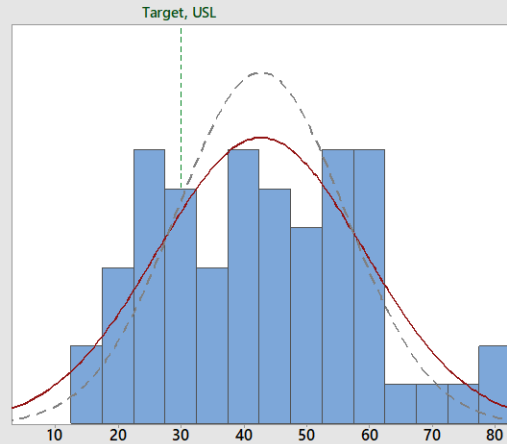


Normality Test
(Anderson-Darling)

Results	Pass
P-value	0.254

Capability Analysis for June T1-T8
Process Performance Report

Capability Histogram
Are the data below the limit and close to the target?



— Actual (overall) capability is what the customer experiences.

--- Potential (within) capability is what could be achieved if process shifts and drifts were eliminated.

Process Characterization

Total N	60
Subgroup size	1
Mean	42.833
Standard deviation (overall)	16.390
Standard deviation (within)	13.343

Capability Statistics

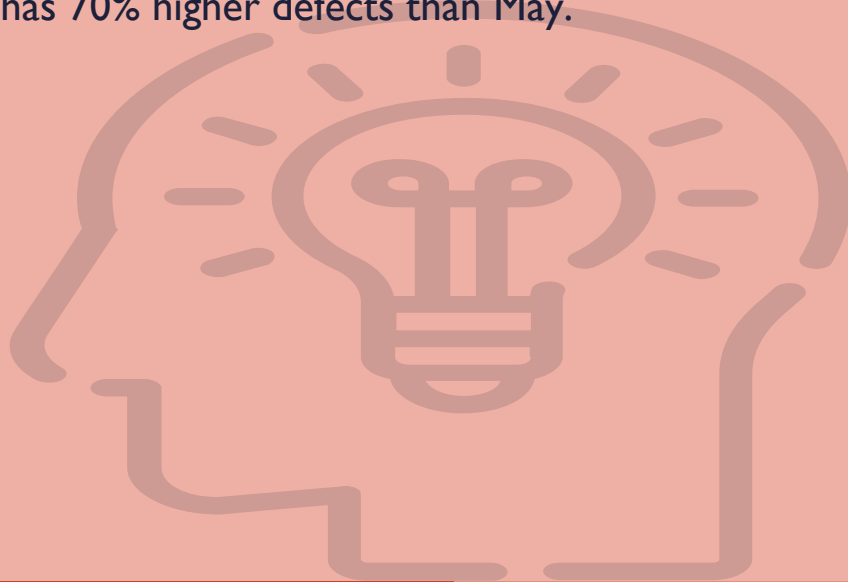
Actual (overall)	
Pp	*
Ppk	-0.26
Z.Bench	-0.78
% Out of spec (observed)	71.67
% Out of spec (expected)	78.32
PPM (DPMO) (observed)	716667
PPM (DPMO) (expected)	783193
Potential (within)	
Cp	*
Cpk	-0.32
Z.Bench	-0.96
% Out of spec (expected)	83.19
PPM (DPMO) (expected)	831927

Interpretation for May & June



Overall Interpretation:

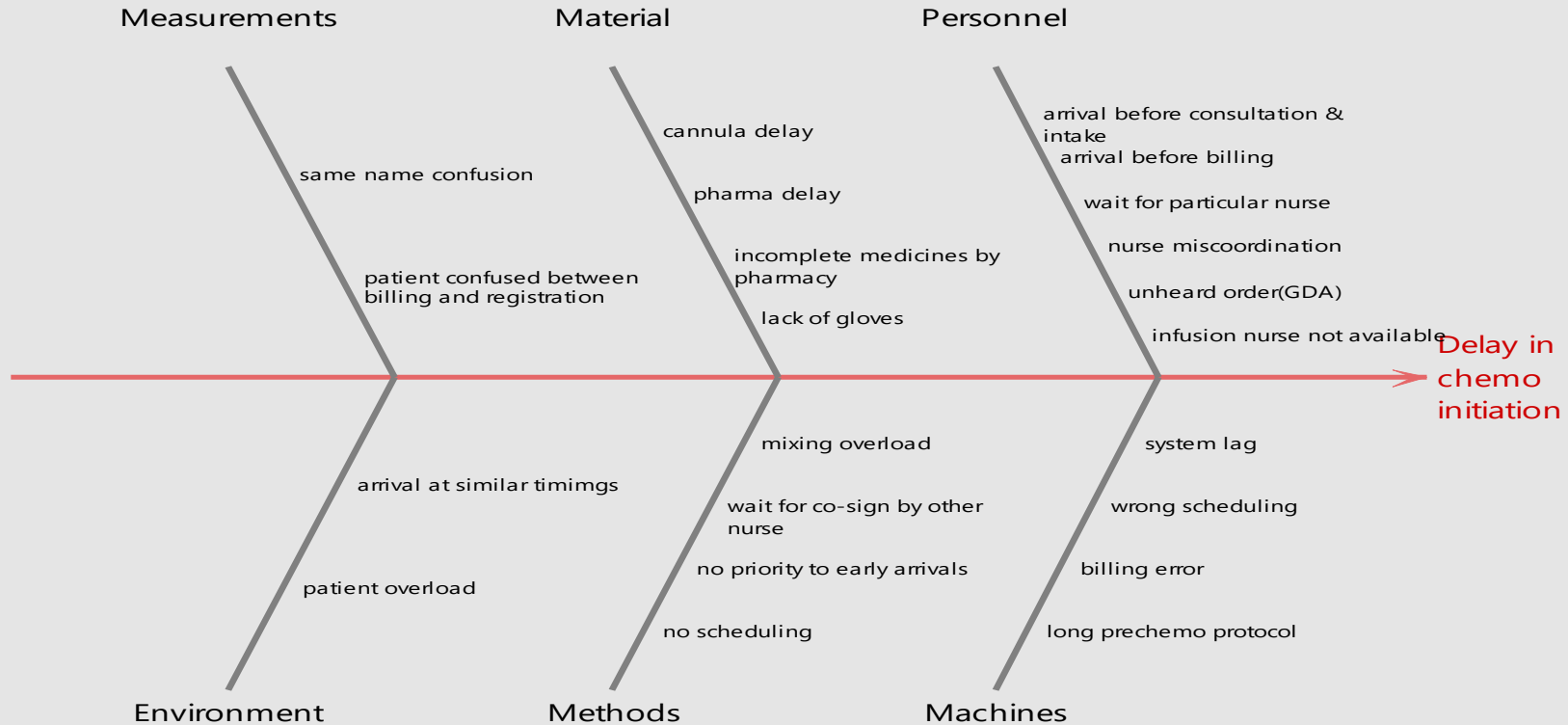
- The mean of both the months differ from one another, the standard deviation of both differs enormously as the standard deviation of June month is near twice the standard deviation of May.
- The median value of June = 2x of May month.
- Defects- June month has 70% higher defects than May.



FINDINGS



Cause-and-Effect Diagram





CONCLUSION

01

The turnaround time of May month falls under the specified target minutes but for the month of June, the process was incapable to fall in that target range.

02

No variation in any observations of the May month data was observed except for the **step 5 and 7**.

- mixing nurse receiving the chemo drugs
- infusion nurse receiving mixed drug from the Adm. room.

03

June month data most time-consuming steps were **steps 4 & 6**.

- physical dispense from the pharmacy
- drug mixing time.

RECOMMENDATIONS:

Inform patients about their journey- front desk



Schedule patients

Follow Proper patient protocols



Avoid communication gaps

Check the 'daily tracker' of Chemo TAT weekly



Reduce data fudging by control checks

it
ALWAYS
SEEMS
IMPOSSIBLE
UNTIL
it is
DONE.

“Thank-you!”

